

REMARKS

Claims 1, 10-11, 13-17, 30, 35-38, 43-44, 46-47, and 49 have been amended.

Claims 45, 61-63, have been cancelled without prejudice.

Claims 70 and 71 have been added.

Claims 1-6, 8, 10-17, 19, 30, 35-44, 46, 47, 49, 55-60, and 64-71 are currently pending in this application.

Claims 1, 38, and 49 are in independent format.

1. Provisional Double Patenting

The Examiner's provisional nonstatutory double patenting rejection of Claims 1-6, 8, 10-17, 19, 30, 38-44, 46-47, 49, and 55-60 over co-pending U.S. Patent Application Serial No. 11/980,918 to Chou in view of *Nanoimprint Lithography, Journal of Vacuum Science & Technology B* 14(6), pages 4129-41232 (1996) to Chou, Krauss & Renstrom, is acknowledged.

As this is a *provisional* double patenting rejection, and because the co-pending application has not yet issued as a patent, Applicant will timely file a suitable terminal disclaimer upon the indication of claims which are otherwise deemed to be in condition for allowance.

2. Rejections Under 35 U.S.C. § 103(a)

A *prima facie* case of obviousness under 35 U.S.C. § 103 requires three criteria to be met. First, the combination of cited references must teach or suggest all of the claimed limitations; second, there must be some suggestion or motivation in the references themselves to modify or combine the references; and third, there must be a

reasonable expectation of success for the modification or combination of references. The teaching or suggestion to make the modification or combination, and the reasonable expectation of success must both be found in the prior art, and not based on an Applicant's disclosure. *In re Vaeck*, 947 F.2d 448, 20 USPQ2d 1438 (Fed. Cir. 1991). The teachings, motivations, or suggestions to combine the references must be based on objective evidence of record and cannot be resolved on subjective belief and unknown authority. *In re Lee*, 277 F.3d 1338, 61 USPQ2d 1430 (Fed. Cir. 2002). Additionally, there must be particular findings as to the specific understanding or principle within the knowledge of a skilled artisan that would have motivated one with no knowledge to the claimed invention to combine or modify the references. *In re Kotzab*, 217 F.3d 1365, 55 USPQ2d 1313 (Fed. Cir. 2000). **The various cited references, however, do not meet these requirements, particularly in view of amendments to the claims as discussed below.**

a. Claims 1-4, 6, 8, 10-12, 14-17, 19, 30, 35-40, 42-44, 46-47, 49, 55-56, 58, and 60

The Examiner's rejection of Claims 1-4, 6, 8, 10-12, 14-17, 19, 30, 35-40, 42-44, 46, 47, 49, 55-56, 58, and 60 under 35 U.S.C. § 103(a) as being unpatentable over *Chou, Krauss, and Renstrom* ("Nanoimprint Lithography", Journal of Vacuum Science & Technology B 14(6), pages 4129-4132 (1996)) in view of U.S. Patent No. 5,731,086 to *Gebhardt et al.* is respectfully traversed.

The Examiner's stated basis for the rejection is that the *Chou et al.* publication discloses all of the steps of the method of Claim 1 but for curing the polymeric

composition film. The Examiner contends that the '086 *Gebhardt et al.* reference teaches thermal and/or photocuring of a polymeric composition, and hence, it would have been obvious to one of ordinary skill in the art to modify the teachings of the *Chou et al.* publication with the thermal and/or photo curing of the '086 *Gebhardt et al.* reference.

The claims of the present invention relate specifically to nanoscale imprinting processes on a sub-200 nm scale as first disclosed in the parent application No. 08/558,809, now U.S. Patent No. 5,772,905 which was filed in November, 1995, and from which priority is claimed, pre-dating the *Chou et al.* publication which was published in late 1996. Hence, the *Chou et al.* publication is not believed to properly be prior art against the claims as amended. The '086 *Gebhardt et al.* reference is cited by the Examiner only for the teachings of a thermal and/or photocuring polymer, and is directed towards the use of thermoset resins and polymers in the assembly line manufacturing of relatively large scale printed circuit boards or printed wiring configurations. (See: Col. 1, lines 20-67; Col. 7, line 38 - Col. 8, Line 12). The '086 *Gebhardt et al.* reference fails to render obvious the limitations of independent Claims 1, 38, and 49, and in particular, fails to render obvious the use of a thermally or photocurable polymeric composition film in a method for imprinting nanoscale features (Claim 49) or in such nanoscale imprinting methods which include the steps of curing (Claim 1) or crosslinking (Claim 38) the film after imprinting of the nanoscale features.

Since the *Chou et al.* publication is not seen as prior art to independent Claims 1, 38, and 49 as amended in view of the present applications claim of priority to the '809 application, and the remaining '086 *Gebhardt et al.* reference fails to render obvious all

of the claimed limitations, the independent Claims are seen as patentable under 35 U.S.C. § 103(a) over the *Chou et al.* publication in view of the '086 *Gebhardt et al.* patent. Dependent claims 2-4, 6, 8, 10-12, 14-17, 19, 30, 35-37, 39-40, 42-44, 46, 47, 55-56, 58, and 60 are similarly seen as patentable under 35 U.S.C. § 103(a) over the cited combination of references for the same reasons.

b. Claims 5 and 41

The Examiner's rejection of Claims 5 and 41 under 35 U.S.C. § 103(a) as being unpatentable over *Chou, Krauss, and Renstrom* ("Nanolimprint Lithography", Journal of Vacuum Science & Technology B 14(6), pages 4129-4132 (1996)) in view of U.S. Patent No. 5,731,086 to *Gebhardt et al.*, and further in view of U.S. Patent Application Publication No. 2002/0102490 A1 to *Ito et al.* is respectfully traversed.

The Examiner's stated basis for the rejection is that the combination of the *Chou et al.* publication and the '086 *Gebhardt et al.* patent teach the method of Claim 1, but do not teach a monomer composition. The Examiner contends that the '490 *Ito et al.* publication is in the same field of endeavor, and teaches a monomer comprising alkyl methacrylate and fluorinated alkyl methacrylates. Hence, the Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combination of *Chou et al.* and *Gebhardt et al.* with a functional equivalent such as taught by *Ito et al.*.

As noted above, the present application is related to, and claims priority to U.S. Patent Application No. 08/558,809, now U.S. Patent No. 5,772,905 which was filed in November, 1995, as well as U.S. Patent Application No. 09/107,006 filed on June 30,

1998, now U.S. Patent No. 6,309,580 B1. The use of methacrylates in the present invention was fully disclosed in the parent applications at least as of June 30, 1998, and can be found at Col. 8, line 63 – Col. 9, line 11 of the '580 *Chou* patent. Hence, as is shown above with respect to the *Chou et al.* publication, the '490 *Ito et al.* published application is not properly prior art to the claimed invention under 35 U.S.C. § 103(a), as the '490 *Ito et al.* published application has a priority date of only January, 2001.

Since the *Chou et al.* publication and the '490 *Ito et al.* published application are not seen as prior art to Claims 5 and 41 in view of the claim of priority to the '809 and '006 applications, and the remaining '086 *Gebhardt et al.* reference fails to render obvious all of the claimed limitations, the dependent claims are seen as patentable under 35 U.S.C. § 103(a) over the *Chou et al.* publication in view of the '086 *Gebhardt et al.* patent and further in view of the '490 *Ito et al.* published application.

c. Claim 13

The Examiner's rejection of Claim 13 under 35 U.S.C. § 103(a) as being unpatentable over *Chou, Krauss, and Renstrom* ("Nanolithography", Journal of Vacuum Science & Technology B 14(6), pages 4129-4132 (1996)) in view of U.S. Patent No. 5,731,086 to *Gebhardt et al.* and further in view of U.S. Patent No. 5,981,616 to *Yamamura* is respectfully traversed.

The Examiner's stated basis for the rejection is that the combination of the *Chou et al.* publication and the '086 *Gebhardt et al.* patent teach the method of Claim 9, but do not teach an oligomer. The Examiner contends that the '616 *Yamamura* patent is in the same field of endeavor, and teaches a photocurable polymeric composition

comprising an oligomer. Hence, the Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combination of *Chou et al.* and *Gebhardt et al.* with the teaching of the '616 *Yamamura et al.* patent for the benefit of forming three dimensional structures using polymers with targeted photocurable properties.

As noted above, the present application is related to, and claims priority to U.S. Patent Application No. 08/558,809, now U.S. Patent No. 5,772,905 which was filed in November, 1995. Hence, as shown above, the *Chou et al.* publication is not properly prior art to the claimed invention under 35 U.S.C. § 103(a). The remaining combination of cited references completely fails to render obvious the limitations of dependent Claim 13. Neither the '086 *Gebhardt et al.* patent (discussed previously) or the '616 *Yamamura et al.* patent are related to the endeavors of nanoscale imprinting. The '616 *Yamamura et al.* patent is directed towards photocurable resins which are utilized in the laminate construction of three-dimensional objects, using a process whereby individual layers of a photocurable resin are individually exposed to a source of light to effect photocuring in the desired three-dimensional shape, slowly building the finished product in a layer-by-layer construction technique, wherein each cured layer is submerged into an uncured material to permit the photocuring of the next consecutive layer. (See: Col. 1, lines 22-39; Col. 17, lines 33-67). There is no teaching or suggestion in the '616 *Yamamura et al.* patent that the resin materials disclosed therein are suitable for use in reproduction of nanoscale imprints. In fact, the '616 *Yamamura et al.* patent is in fact concerned with object features only on the order of 0.10 mm. (Col. 16, lines 37-40). One of ordinary skill in the art would have no motivation to utilize the teachings of the '616

Yamamura et al. patent in a nanoscale imprinting process, as there is no teaching or suggestion the disclosed resin would be suitable for reproducing features at that scale, and no expectation of success.

Since the *Chou et al.* publication is not seen as prior art to Claim 13 in view of the claim of priority to the '809 application, and the combination of the remaining '086 *Gebhardt et al.* and '616 *Yamamura et al.* references fails to disclose all of the claimed limitations and lacks any reasonable expectation of a successful combination useful in a method for nanoscale imprinting, dependent Claim 13 is seen as patentable under 35 U.S.C. § 103(a) over the *Chou et al.* publication in view of the '086 *Gebhardt et al.* patent and further in view of the '616 *Yamamura et al.* patent.

d. Claim 57

The Examiner's rejection of Claim 57 under 35 U.S.C. § 103(a) as being unpatentable over *Chou, Krauss, and Renstrom* ("Nanolithographic Lithography", Journal of Vacuum Science & Technology B 14(6), pages 4129-4132 (1996)) in view of U.S. Patent No. 5,731,086 to *Gebhardt et al.* and further in view of U.S. Patent No. 5,529,891 to *Wang et al.* is respectfully traversed.

The Examiner's stated basis for the rejection is that the combination of the *Chou et al.* publication and the '086 *Gebhardt et al.* patent teach the method of Claim 49, but do not teach a polymer comprising a poly(methylhexadecylsiloxane). The Examiner contends that the '891 *Wang et al.* patent teaches the use of a poly(methylhexadecylsiloxane) in a photographic element, and that hence it would have been obvious to one of ordinary skill in the art to modify the thermoplastic polymer in the

combination of the *Chou et al.* and *Gebhardt et al* references with the *Wang et al.* polymer because they are equivalent and that the substitution of one for the other would produce an expected result.

As noted above, the present application is related to, and claims priority to U.S. Patent Application No. 08/558,809, now U.S. Patent No. 5,772,905 which was filed in November, 1995. Hence, as shown above, the *Chou et al.* publication is not properly prior art to the claimed invention under 35 U.S.C. § 103(a). The remaining combination of cited references completely fails to render obvious the limitations of dependent Claim 57. Neither the '086 *Gebhardt et al.* patent (discussed previously) or the '891 *Wang et al.* patent are related to the endeavors of nanoscale imprinting. In fact, the '891 *Wang et al.* patent has nothing to do with any imprinting processes at all, and one of ordinary skill in the art would have no motivation to look to the teachings of the '891 *Wang et al.* patent for anything related to such imprinting processes. The '891 *Wang et al.* patent is directed to a photographic element having an improved scratch resistance by providing a protective layer having lubricant particles therein. The disclosure of poly(methylhexadecylsiloxane) in the '891 *Wang et al.* patent at Col. 3, lines 42-46 is in the context of a lubricant particle, and is completely unrelated to uses in nanoscale imprinting such as required by dependent Claim 57, and one of ordinary skill in the art would have no expectation to successfully utilize a lubricant particle as an imprinting film for a nanoscale imprinting process. Merely identifying a reference as disclosing a material recited in a claimed limitation does not render the use of the material in the claim obvious.

Since the *Chou et al.* publication is not seen as prior art to Claim 57 in view of the claim of priority to the '809 application, and the combination of the remaining '086 *Gebhardt et al.* and '891 *Wang et al.* references fails to disclose all of the claimed limitations and lacks any reasonable expectation of a successful combination or composition useful in a method for nanoscale imprinting, dependent Claim 57 is seen as patentable under 35 U.S.C. § 103(a) over the *Chou et al.* publication in view of the '086 *Gebhardt et al.* patent and further in view of the '891 *Wang et al.* patent.

e. *Claim 59*

The Examiner's rejection of Claim 59 under 35 U.S.C. § 103(a) as being unpatentable over *Chou, Krauss, and Renstrom* ("Nanolithography", Journal of Vacuum Science & Technology B 14(6), pages 4129-4132 (1996)) in view of U.S. Patent No. 5,731,086 to *Gebhardt et al.* and further in view of U.S. Patent No. 5,866,294 to *Oguni et al.* is respectfully traversed.

The Examiner's stated basis for the rejection is that the combination of the *Chou et al.* publication and the '086 *Gebhardt et al.* patent teach the method of Claim 49, but do not teach a polymer comprising a poly(octadecyl-methacrylate). The Examiner contends that the '294 *Oguni et al.* patent teaches the use of a polymethacrylate with a low glass transition temperature, and that hence it would have been obvious to one of ordinary skill in the art to modify the thermosettable polymer composition and photocurable composition in the combination of the *Chou et al.* and *Gebhardt et al.* references with the *Oguni et al.* polymer because they are equivalent and that the substitution of one for the other would produce an expected result.

As noted above, the present application is related to, and claims priority to U.S. Patent Application No. 08/558,809, now U.S. Patent No. 5,772,905 which was filed in November, 1995. Hence, as shown above, the *Chou et al.* publication is not properly prior art to the claimed invention under 35 U.S.C. § 103(a). The remaining combination of cited references completely fails to render obvious the limitations of dependent Claim 59. Neither the '086 *Gebhardt et al.* patent (discussed previously) or the '294 *Oguni et al.* patent are related to the endeavors of nanoscale imprinting. In fact, the '294 *Oguni et al.* patent has nothing to do with any imprinting processes at all, and one of ordinary skill in the art would have no motivation to look to the teachings of the '294 *Oguni et al.* patent for anything related to nanoscale imprinting processes. The '294 *Oguni et al.* patent is directed to a laminated lithographic printing plate having a photosensitive layer containing various compounds. The disclosure of polymethylacrylate in the '294 *Oguni et al.* patent at Col. 19, lines 1-7 is in the context of a binding polymer (Col. 17, lines 53-55), and is completely unrelated to uses in nanoscale imprinting such as required by dependent Claim 59. One of ordinary skill in the art would have no expectation to successfully utilize a binding polymer particle as an imprinting film for a nanoscale imprinting process. Merely identifying a reference as disclosing a material recited in a claimed limitation does not render the use of the material in the claim obvious.

Since the *Chou et al.* publication is not seen as prior art to Claim 59 in view of the claim of priority to the '809 application, and the combination of the remaining '086 *Gebhardt et al.* and '294 *Oguni et al.* references fails to disclose all of the claimed limitations and lacks any reasonable expectation of a successful combination or composition useful in a method for nanoscale imprinting, dependent Claim 59 is seen as

patentable under 35 U.S.C. § 103(a) over the *Chou et al.* publication in view of the '086 *Gebhardt et al.* patent and further in view of the '294 *Oguni et al.* patent.

f. Claims 45 and 61-69

Claims 45, 61, 62, and 63 have been cancelled.

The Examiner's rejection of Claims 64-69 under 35 U.S.C. § 103(a) as being unpatentable over *Chou, Krauss, and Renstrom* ("Nanoimprint Lithography", Journal of Vacuum Science & Technology B 14(6), pages 4129-4132 (1996)) in view of U.S. Patent No. 5,731,086 to *Gebhardt et al.* and further in view of U.S. Patent Application Publication No. US 2003/0017424 A1 to *Park et al.* is respectfully traversed.

The Examiner's stated basis for the rejection is that the combination of the *Chou et al.* publication and the '086 *Gebhardt et al.* patent teach the methods of Claim 64-69, but do not teach post imprint thermal baking, post imprint UV exposure, or both. The Examiner contends that the '424 *Park et al.* published application teaches to fix a pattern after imprinting by thermal treatment, UV exposure, or other appropriate curing means. Hence, the Examiner contends it would have been obvious at the time of the invention to modify the combination of the *Chou et al.* publication and *Gebhardt et al.* patent with the teachings of the '424 *Park et al.* published application to help fix and solidify the imprinted pattern.

As noted above, the present application is related to, and claims priority to U.S. Patent Application No. 08/558,809, now U.S. Patent No. 5,772,905 which was filed in November, 1995, as well as U.S. Patent Application No. 09/107,006 filed on June 30, 1998, now U.S. Patent No. 6,309,580 B1. The use of polymer materials which are

curable by temperature or irradiation in the present invention was fully disclosed in the parent applications at least as of June 30, 1998, and can be found at Col. 8, lines 47 – 50 of the '580 *Chou* patent. Hence, as is shown above with respect to the *Chou et al.* publication, the '424 *Park et al.* published application is not properly prior art to the claimed invention under 35 U.S.C. § 103(a), as the '424 *Park et al.* published application has a priority date of only July 2001.

Since the *Chou et al.* publication and the '424 *Park et al.* published application are not seen as prior art to Claims 64-69 in view of the claim of priority to the '809 and '006 applications, and the remaining '086 *Gebhardt et al.* reference fails to render obvious all of the claimed limitations, the dependent claims are seen as patentable under 35 U.S.C. § 103(a) over the *Chou et al.* publication in view of the '086 *Gebhardt et al.* patent and further in view of the '424 *Park et al.* published application.

3. New Claims

New Claims 70 and 71 have been added as dependent claims containing limitations deleted from independent Claim 1 by the present amendment. New Claims 70 and 71 are believed to be allowable over the cited references for at least the same reasons as independent parent Claim 1.

4. Conclusion

Based on the foregoing, the allowance of all pending claims is requested. If for any reason the Examiner is unable to allow the application on the next Office Action and feels that an interview would be helpful to resolve any issues, the Examiner is

respectfully requested to contact the undersigned attorney for the purpose of arranging such an interview.

Respectfully submitted,

/Mark E. Books, Reg. No. 40918/

Mark E. Books, Reg. No. 40,918
Polster, Lieder, Woodruff & Lucchesi, L.C.
12412 Powerscourt Drive, Suite 200
St. Louis, Missouri 63131
Tel: (314) 238-2400
Fax: (314) 238-2401